STATE OF OHIO
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DEPARTMENT OF NATURAL RESOURCES
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DIVISION OF GEOLOGICAL SURVEY
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BEDROCK GEOLOGY OF THE CARROLLTON QUADRANGLE, CARROLL COUNTY, OHIO

by

Richard M. DeLong

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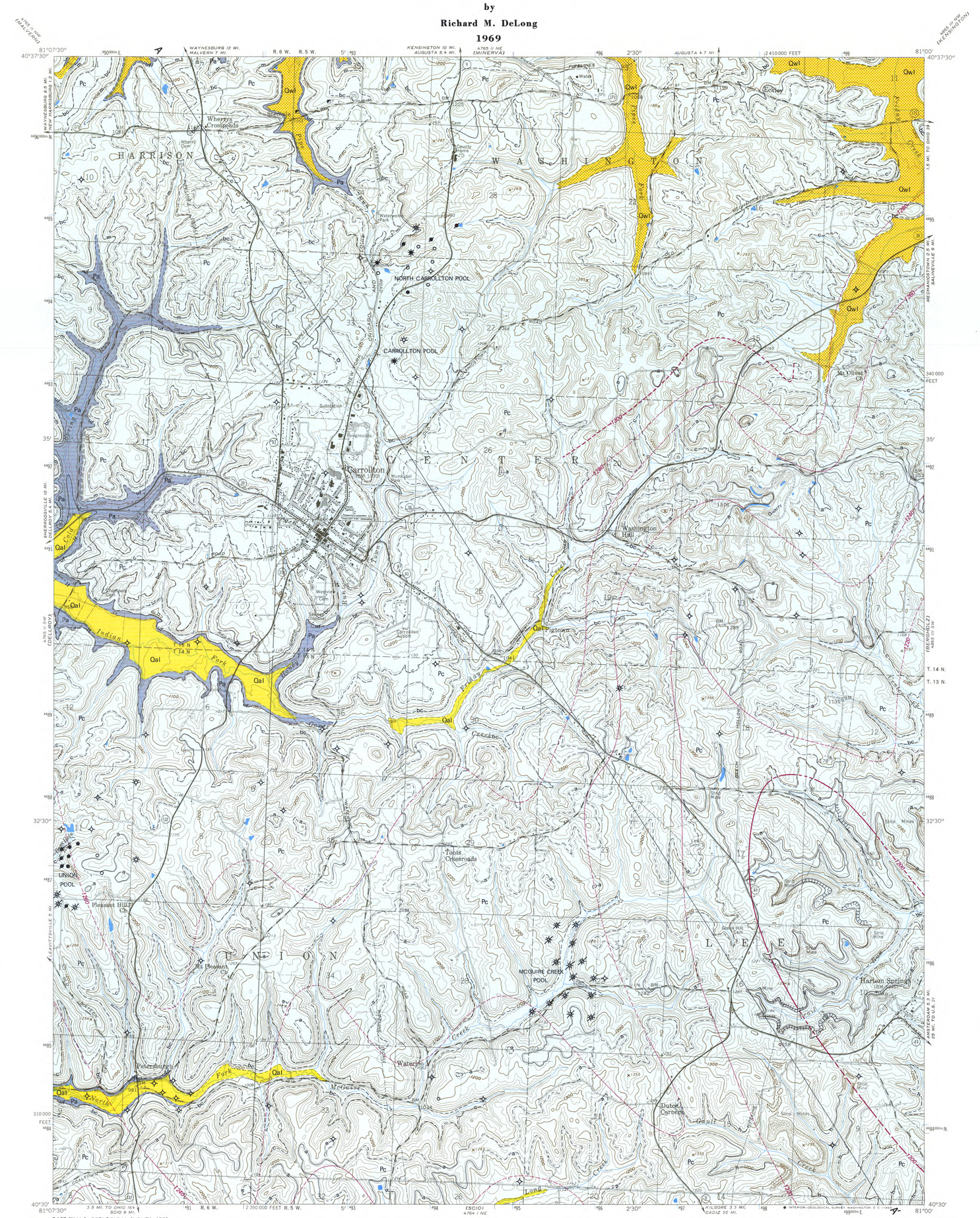
OHIO DIVISION OF GEOLOGICAL SURVEY
REPORT OF INVESTIGATIONS NO. 71

BEDROCK GEOLOGY OF THE
CARROLLTON QUADRANGLE, OHIO

SYSTEM	GROUP	BED	LITHOLOGY	THICKNESS IN FEET	DESCRIPTION
QUATERNARY		Alluvium Lake deposits		0-40	Alluvium, brown to light-yellow-gray; mixed clay, silt, sand, and rock fragments. Lake deposits, medium-light-gray, clayey and plastic to sandy.
PENNSYLVANIAN	Conemaugh	Morgantown sandstone and shale		60±	Sandstone, tan to brown, thin- to medium-bedded; medium-grained near base; as much as 13 feet thick. Poorly exposed nonresistant shale, thin-bedded sandstone, and probably the Clarksburg coal upward.
		Elk Lick coal		0-0.1	Coal, discontinuous.
		Elk Lick limestone		0-2.0	Limestone, light-olive-gray, nodular, fresh-water; weathers brown.
				22-42	Shale, medium- to light-gray; varying upward to poorly bedded shale and mudstone.
					Limestone, gray, ferruginous; sparse to abundant marine fauna; interbedded with shale, black, thin-bedded, fossiliferous. Discontinuous and commonly separated from Duquesne coal by 2 to 3 feet of shale.
		Skelley limestone		0-1.3	Coal, bony, discontinuous.
		Duquesne coal		0-0.6	Clay, gray, plastic, discontinuous.
		Duquesne clay		0-1.5	Shale, pale-olive-gray or variegated, thin- to poorly bedded. Sandstone, gray; massive at base, thin-bedded upward; locally replaces Ames limestone.
				14-31	Limestone, gray to pale-olive-gray, medium-crystalline, bedded; locally nodules embedded in shale; abundant marine fauna, including crinoid stems.
		Ames limestone		0-9.5	Coal zone; carbonaceous shale, irregular in distribution.
		Ames coal		0-0.5	Shale; gray or greenish-gray shale to thin-bedded carbonaceous shale to medium-bedded gray sandy shale or mudstone. Sandstone lenses, gray to greenish-gray, medium-bedded; interbedded with shale and locally resting on Harlem coal.
				5-21	Coal, single bench with nonpersistent ¼-inch shale partings; locally replaced by shale.
		Harlem coal		0-2.5	Clay, light- to medium-gray, plastic to semiplastic.
		Harlem clay		0-5.8	Limestone, yellow to reddish-tan, nodular, finely crystalline, local.
		Rock Riffle limestone		0-1.1	Shale, gray to olive-drab; poorly bedded in lower part. Mudstone, red or variegated, soft, calcareous, semiplastic; found at top of unit, representing Round Knob. Sandstone, tan to gray, fine- to medium-grained; thick-bedded at base; shaly upward.
		Saltsburg shale and sandstone and Round Knob shale		32	Coal, discontinuous.
		Barton coal		0-0.1	Limestone, gray to brown, fresh-water; nodules to argillaceous masses.
		Ewing limestone		0-2.0	Shale, gray to pale-olive-drab, well-bedded to poorly bedded, sandy; interbedded with sandstone, fine-grained, thin-bedded to shaly. Mudstone, tan, brown, or red, in upper part.
		Cow Run shale and sandstone		50	Limestone, limonitic, nodular; nodules up to 2 inches in diameter; abundant marine fauna; discontinuous.
		Portersville limestone		0-0.1	Coal, shaly, local.
		Anderson coal		0-2.3	Clay, brown, plastic, local.
		Anderson clay		0-0.4	Shale, gray to brown; thin-bedded at base, varying upward to poorly bedded shale or mudstone. Sandstone, gray, fine-grained, shaly; irregular in distribution.
				12-20	Limestone, gray, limonitic, nodular; dwarfed marine fauna; discontinuous.
		Cambridge limestone		0-0.1	Coal, bony, discontinuous; varying to carbonaceous shale.
		Wilgus coal		0-5.0	Clay, light-gray, plastic, local.
		Wilgus clay		0-1.3	Shale, pale-olive-gray with medium-gray interbeds; well-bedded below; poorly bedded to mudstone upward; calcareous and locally containing fresh-water limestone nodules at top. Sandstone, brown; locally massive and medium-grained at base; commonly thin- to medium-bedded, fine- to medium-grained, poorly sorted. Replaces Brush Creek marine beds and coal in sec. 23, Washington Township.
		Buffalo shale and sandstone		41-53	Shale, dark-gray, fissile, locally fossiliferous. Limestone, gray, nodular; weathers yellow; abundant marine fauna; nodules locally found embedded in Buffalo shale up to 10 feet above Brush Creek coal.
		Brush Creek marine beds		0-1.0	Coal, shaly, to coaly shale; local.
		Brush Creek coal		0-0.5	Clay, carbonaceous, semiplastic, local.
		Brush Creek clay		0-0.3	Shale, gray to brown, thin-bedded to irregularly bedded. Sandstone, brown, thin- to medium-bedded, fine-grained, local; interbedded with shale.
		Upper Mahoning shale and sandstone		56	Coal; two benches separated by shale 2 to 10 inches thick.
		Mahoning coal		0-2.5	Clay, light-gray, plastic; locally flint in part.
		Thornton clay		0-2.0	Shale, light-gray to tan, thin- to medium-bedded; massive-bedded shale to mudstone at top. Sandstone, light-gray to brown, thin- to medium-bedded, fine to medium-grained.
		Lower Mahoning shale and sandstone		23-30	Coal, irregular in thickness.
	Allegheny	Upper Freeport (No. 7) coal		0-2.0	Clay, light-gray, plastic to semiplastic; flint in part where unit is locally thick.
		Upper Freeport clay		2.0-13.0	Shale, tan, sandy; thin-bedded to poorly bedded upward. Sandstone, light-gray to brown, thin- to medium-bedded, fine- to medium-grained. Minimum thickness observed on outcrop; maximum thickness reported in shaft to Middle Kittanning coal in sec. 35, Washington Township.
		Upper Freeport shale and sandstone		54-80	Coal, with shale parting 1-inch thick.
		Lower Freeport (No. 6A) coal		1-1.9	Clay, light-gray, plastic.
		Lower Freeport clay		0.5-3.4	Covered; probably shale or sandy shale.
				10±	

Scale: 1 inch = 21 feet



BASE BY U.S. GEOLOGICAL SURVEY, 1959

10,000-foot grid based on Ohio coordinate system, north zone
1,000-meter Universal Transverse Mercator grid ticks, zone 17, shown in blue

Cartographic drafting by Philip Celnar

SCALE 1:24 000

CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL

UTM GRID AND 1959 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

QUADRANGLE LOCATION

EXPLANATION

Recent / Pleistocene — QUATERNARY

Qal — Alluvium

Qwl — Wisconsin lake deposits

Middle Pennsylvanian — PENNSYLVANIAN

Conemaugh Group
a, *Ames limestone*
h, *Harlem coal*, mapped only in southeast corner of quadrangle
c, *Cambridge limestone*
bc, *Brush Creek marine beds*
m, *Mahoning coal*

Allegheny Group
uf, *Upper Freeport coal*
lf, *Lower Freeport coal*

Contact
Dashed where approximate

Coal or marine zone
Dashed where approximate

1300 — Structure contour
Drawn on Ames limestone. Long dashed where approximate; short dashed where datum is above land surface; omitted in northwest where Ames is absent. Approximate position of Ames in southeast corner determined by projection from Harlem coal. Contour interval 20 feet

- Oil well
- Abandoned oil well
- Gas well
- Abandoned gas well
- Oil and gas well
- Abandoned oil and gas well
- Dry hole
- Dry hole with show of gas
- Drilled hole, no data
- Abandoned shaft or slope mine in Middle Kittanning coal
- Coal strip mine, post-1959

MINERAL RESOURCES

Coal.—The Middle Kittanning coal has been mined by shafting in sec. 35, Washington Township, where the coal is approximately 4 feet thick and lies 160 feet below drainage. This coal would also be found along Indian Fork and North Fork McGuire Creek, probably at depths of no more than 80 feet along the former and about 150 feet along the latter.

The Lower Freeport coal is slightly above drainage along Indian Fork at the western edge of the Carrollton quadrangle map area and along Cold Spring Run. Where it was formerly mined by drift methods along Indian Fork (Lamborn, 1942, p. 18), the coal is 2 feet thick, including a 1-inch shale parting.

The Upper Freeport coal is highly variable in thickness but has been mined in the past on a small scale. Abandoned openings are found in sec. 1, Center Township, in secs. 3 and 9, Union Township, where Lamborn (1942, p. 21) reported the coal too thin for profitable mining, and in sec. 34, Washington Township. The coal is apparently absent in at least part of sec. 7, Center Township (Lamborn, 1942).

The Mahoning coal is about 2 feet thick in Harrison and western Center Townships, and it has been mined at several localities in this area.

The Harlem coal was named by Newberry (1874, p. 156) for Harlem Springs where the bed has supported mining for over a century. The coal is commonly about 2 feet thick and without partings in that vicinity, but pinches out in Center and Washington Townships, and thins to a foot or less in Union Township.

Clay and shale.—Although several clays crop out in the area, none have been utilized by the ceramics industry. Stout and others (1923, p. 428-429) report the chemical and ceramic characteristics of a 4-foot bed of flint clay found in the southern part of sec. 7, Center Township, and identified as Bolivar by Stout. The relatively high alumina content (23.17 percent) and Pyrometric Cone Equivalent (P.C.E.) value of 27 suggest that this clay has potential as a low-heat duty refractory. The flint clay generally occurs in lenticular and unsymmetrical bodies within the plastic clay and is therefore very uncertain in extent and thickness. The Upper Freeport, Thornton, and Harlem clays all have sufficient continuity and thickness to be of potential economic value but their physical properties and chemical composition have not been determined.

Shale is in great abundance but has been quarried only in sec. 1, Center Township, where the Lower Mahoning shale was extracted for use in the manufacture of paving brick. The Buffalo shale is of widespread occurrence and has been used in the manufacture of face brick to the northeast (Kensington quadrangle area) and southwest (Bowerston quadrangle area). Everhart and others (1958, p. 8) report that the Brush Creek shale from near Carrollton in Center Township develops a specific gravity of less than 1.5 upon flash firing at 2,400°F. or less and therefore shows promise as a raw material for the manufacture of lightweight aggregate.

Limestone.—The Ames is the only limestone bed within the Carrollton quadrangle map area to have sufficient thickness and continuity to warrant quarrying. This bed is as much as 9½ feet thick in secs. 13 and 14, Center Township, where an extensive quarrying operation was abandoned in 1958. Smaller quarries have been opened, at places in conjunction with stripping of the Harlem coal, but all such operations have been short-lived. The Ames thins to the south to its more common thickness of 2 to 3 feet, and in secs. 9 and 15, Lee Township, it is replaced by sandstone.

Oil and gas.—Oil and gas were produced from the Berea and Cussewago Sandstones of Mississippian age from small pools in sec. 28 and 34, Washington Township (North Carrollton Pool), in sec. 33, Center Township (Carrollton Pool), and in secs. 10 and 11, Union Township (Union Pool). The Union Pool extends southwest into the adjoining Dellroy quadrangle area. A small gas pool in sec. 22, Lee Township (McGuire Creek Pool), now abandoned, produced an unknown quantity of gas from a coal bed, possibly the Lower or Middle Kittanning.

A test of the Albion ("Clinton") Sandstone of Silurian age in sec. 36, Union Township, was dry with a show of gas. Forty-four feet of white sandstone was found at 5,733 feet.

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Newberry, J. S., 1874, The Carboniferous system: Ohio Geol. Survey, v. 2, pt. 1, Geology, p. 81-180.

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